Wilson Creek Sub-basin Bacteria Total Maximum Daily Load

Detailed Implementation Plan

December 2006
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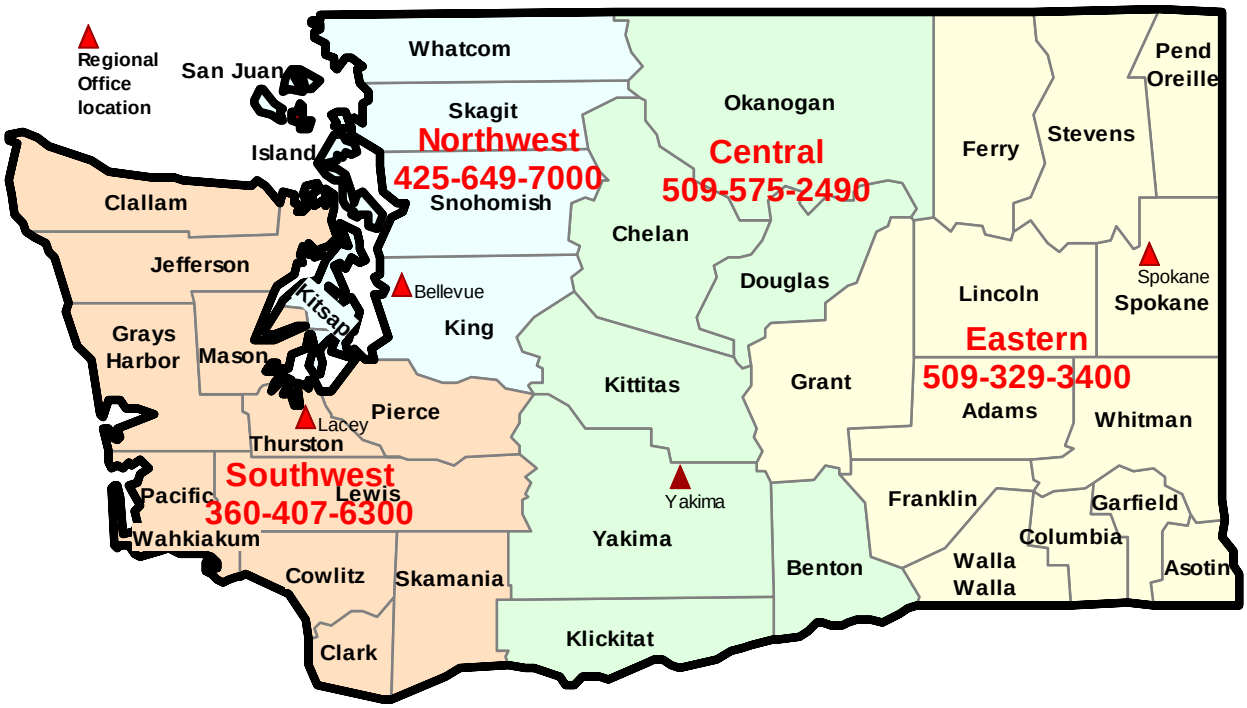

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Finally, the "riparian pasture management guidelines" workgroup produced fine work in a short time, again to benefit all – thank you.

Abstract

This detailed implementation plan (DIP) document outlines the steps that will be taken in an effort to reduce levels of fecal coliform (FC) bacteria in the Wilson Creek sub-basin, in central Washington State. This document expands the FC reduction strategies found in earlier reports written for the *Wilson Creek Sub-basin Bacteria Total Maximum Daily Load (TMDL)*. This DIP also describes likely sources of FC, and specifies the ways in which implementation activities may reduce these pollutants. Lastly, the DIP explains how water quality monitoring will be used to track progress and to indicate when adaptive management procedures may be needed.

Several sources of FC have been identified in the Wilson Creek sub-basin (listed in alphabetical order): domestic pets, humans, livestock, and wildlife. Transport mechanisms include direct deposition and overland runoff. Implementation measures are planned to address all of these causes.

Actions described in this DIP fall into three main categories: (1) implementation of best management practices (BMPs) that will reduce fecal coliform bacteria loading, (2) education and outreach, and (3) monitoring activities. If resources are available, planned monitoring activities include additional FC assessment through the basin, FC source tracking, continued monitoring of FC levels, specific FC transport studies, and possibly other studies.

Progress toward final goals will be measured by achievement of intermediate milestones, including completion of educational activities, implementation of best management practices (BMPs), and achievement of interim targets. Other milestones will include step-wise reduction of FC levels.

TMDL targets are expected to be achieved on schedule (by 2020) for several reasons. A dedicated workgroup (composed of landowners, natural resource managers, and other interested citizens) is working hard to identify and implement appropriate BMPs wherever possible. Various agencies are helping to coordinate and obtain funding for BMP implementation projects. More of these projects are planned for the near future. Monitoring programs have helped establish baseline data to measure future success as well as help identify which pollution sources are natural (background) vs. those related to current anthropogenic activities.

Introduction

The Wilson Creek sub-basin is located in Kittitas County and is part of the larger upper Yakima River basin (water resource inventory area 39). This sub-basin drains most of the area within and surrounding the cities of Ellensburg and Kittitas.

Land uses in the Wilson Creek sub-basin vary from forestland, range, and irrigated agriculture to urban and suburban areas. Figure 1 gives an overview of the water bodies in this sub-basin.

From April through October, levels of fecal coliform (FC) bacteria in the Wilson Creek sub-basin often exceed state water quality standards.

The Washington Department of Ecology (Ecology) collected data on levels of bacteria, suspended sediment, turbidity, organochlorine pesticides, and metals in the upper Yakima River basin in 1999.

In late 2002, a technical advisory workgroup (TAW) was formed to guide Ecology's efforts on the *Wilson Creek Sub-basin Bacteria Total Maximum Daily Load* (TMDL) project. The TAW is composed of local landowners, agency personnel, and others who have a strong interest in and history of caring for the river.

In 2004, a TMDL technical evaluation was completed by Ecology to address FC levels in the Wilson Creek sub-basin. Sources of FC bacteria were identified as (listed in alphabetical order): domestic pets, humans, livestock, and wildlife. Transport mechanisms include direct deposition into water and overland runoff.

Ecology then drafted, and the workgroup reviewed, a TMDL submittal document which includes the technical assessment (Creech and Bohn, 2005). This TMDL submittal document was approved by the U.S. Environmental Protection Agency (EPA) in June 2005. The summary implementation strategy (SIS) portion of the submittal document outlines the goals, objectives, and strategies for achieving cleaner water in the Wilson Creek sub-basin watershed.

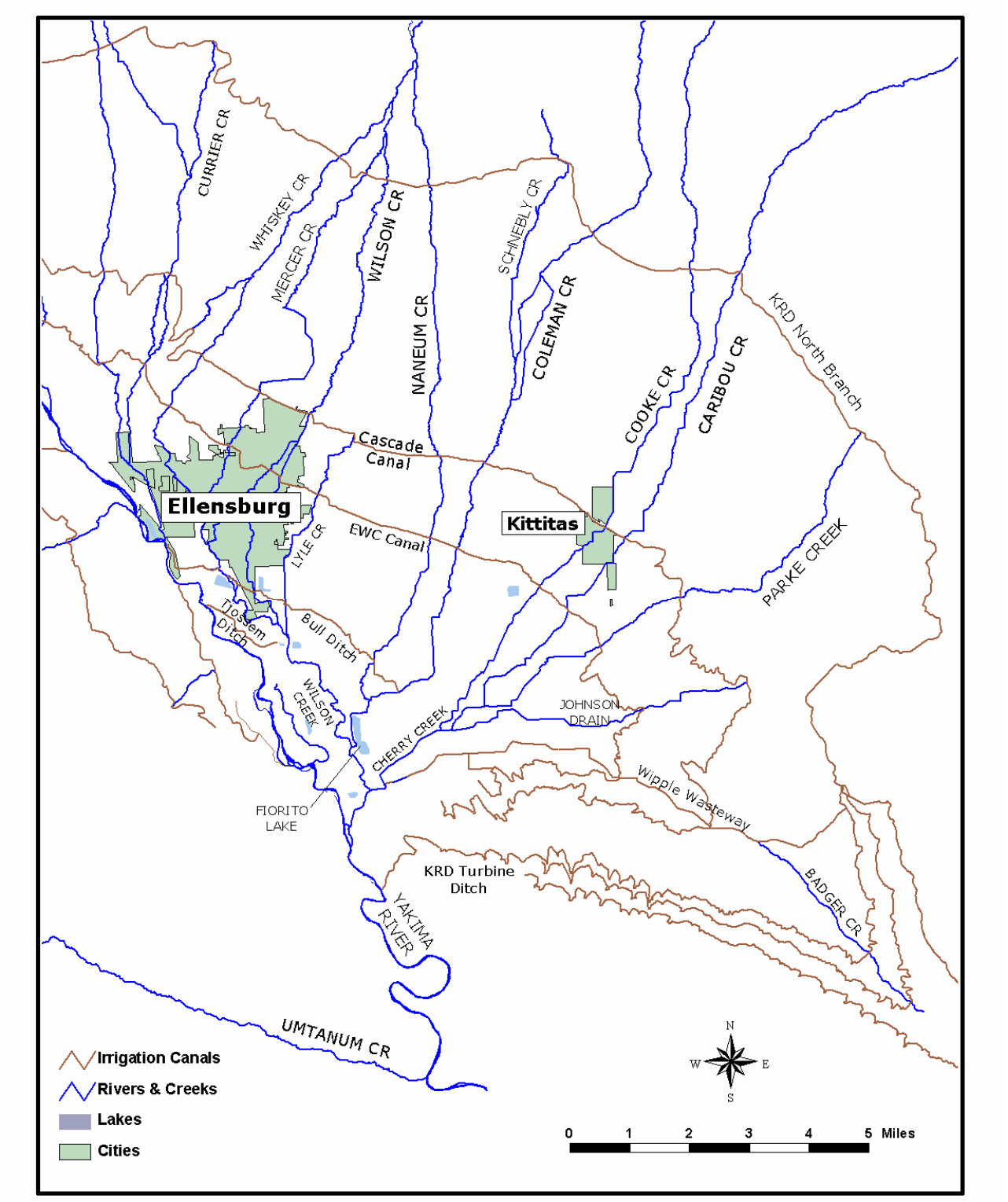

Figure 1: Water bodies (creeks, canals, and drains) in the Wilson Creek sub-basin. Map courtesy of the Kittitas Reclamation District.

This detailed implementation plan (DIP) document[1] is based on the previously written SIS and provides a framework for achieving the TMDL targets[2] established in the *Wilson Creek Sub-basin Bacteria TMDL*. The DIP builds on the technical assessment and submittal documents (referenced above) and on the findings contained in these documents.

In order to meet the water quality targets outlined in this TMDL, numerous appropriate BMPs will need to be employed to effectively reduce FC levels in the Wilson Creek sub-basin. These BMPs include methods to reduce direct deposition of FC, improve the quality of runoff water, and other approaches.

The fundamental implementation strategy for achieving reductions of FC in the Wilson Creek sub-basin watershed is that if the remedies noted above are pursued, anthropogenic FC levels should decline in the Wilson Creek sub-basin. This DIP document specifies the ways in which implementation activities may reduce FC densities in the sub-basin, and how water quality monitoring will be used to track progress toward achieving the stated water quality targets and to indicate when adaptive management procedures may need to be employed.

Full compliance with the water quality targets outlined in the *Wilson Creek Sub-basin Bacteria TMDL* is expected to be achieved by 2020.

Purpose

The purpose of this TMDL is to reduce levels of FC bacteria in Wilson Creek and its tributaries, in order to protect human health within the Wilson Creek sub-basin. FC bacteria occur in many of the sub-basin's water bodies at levels above state Class A water quality criteria and that could pose a health risk to recreational users.

Approach

This plan is meant to be a reasonable approach toward achieving improved water quality within a realistic timeframe under difficult physical and economic circumstances.

The FC bacteria problem in the Wilson Creek sub-basin watershed is not the result of any identified point source pollution. Rather, there are various potential non-point sources such as irrigated fields and pastures with runoff, homes that may have failing streamside septic systems, various domestic animals (pets and livestock) and wildlife found throughout the valley. Typically, TMDLs have met with best success where point-source pollution could be radically reduced. As with other communities dealing with similar non-point bacteria pollution issues, the local approach to the problem needs to be varied, flexible, and adaptive in order to progress toward the water quality improvement goal. These issues will be addressed through further

[1] The "detailed implementation plan" is required and described in the Memorandum of Agreement Between the United States Environmental Protection Agency and Washington Department of Ecology Regarding the Implementation of Section 303(d) of the Federal Clean Water Act

[2] See Appendix A: "TMDL Targets"

monitoring, education, and the implementation of best management practices. The various agencies and organizations in the watershed will work collaboratively to ensure these actions are realized (see Table 1). Several funding sources are available to support water quality improvement work in the watershed. Ecology will support and assist agencies and organizations seeking funding for this work.

The goal of this TMDL is to meet the step-wise TMDL targets for FC reductions (see Appendix A, TMDL Targets) in the Wilson Creek sub-basin. Because Wilson Creek and its tributaries are classified as "Class A" water bodies, the final TMDL target is to meet Class A FC standards, which were developed to protect human health during primary contact recreation (e.g., swimming). By extension, working toward the TMDL goals will also protect human health during secondary contact recreation (e.g., wading and fishing).

This DIP outlines and describes some measures which may help to reduce FC levels. Risks from bacteria sources are subjectively ranked, with priorities for action ranging from "high" to "low." Implementation activities should be addressed in priority order (see Table 2). For example, leaking septic systems are ranked as a high priority because they are most likely to transmit human diseases and cause health problems in humans. Additionally, these measures can be categorized by type of action: (1) implementation of BMPs that will reduce fecal coliform bacteria loading, (2) education and outreach, and (3) monitoring activities. Implementation actions will be undertaken in concert with landowner needs, abilities and desires; supplemental funding may accelerate implementation by landowners. Monitoring FC densities in the project area will occur at least every five to ten years. (See the section on *"Organizational Roles, Activities, and Schedules"* for more detail.)

Further, after careful deliberation, the technical advisory workgroup and Ecology agree on the following:

- Establishing monitoring baselines for FC is important, in order to evaluate future progress;
- Leaking or failing septic systems located near waterways should be identified and fixed;
- Contact between domestic animals (livestock and pets) and area waterways should be reduced; and
- BMPs will be implemented wherever practical to reduce contaminated runoff.

The technical advisory workgroup will continue to advise Ecology on all further decisions made regarding this TMDL. Contact Ecology if your organization would like to work with the technical advisory group.

Pollution Transport Mechanisms and Sources

Transport Mechanisms

The two main transport mechanisms for FC are (1) direct deposition of fecal material into a water body, and (2) overland transport of the waste into a water body. Direct deposition of FC occurs when an animal deposits fecal material into a water body OR when seepage or discharge of inadequately treated sewage enters a water body. Overland transport of FC occurs when fecal material is deposited on land and is washed into a water body by surface water flows, generally from rain, snowmelt or irrigation water.

A third transport mechanism within the Wilson Creek sub-basin is re-suspension of FC, which occurs when FC buried in stream sediments re-enters the water column when sediments are disturbed.

Pollution Sources

As noted earlier, the known sources of FC input in the Wilson Creek sub-basin are (in alphabetical order): domestic pets, humans, livestock and wildlife.

Domestic pets:

- Domestic pet owners leave pet waste in locations where it can be washed into water bodies by overland surface water flows.
- Pet waste is disposed of by deposition into water bodies by pet owners.

Humans:

- Leaking or failing septic systems near area water bodies are the main mode of entry of human waste in the waters of the Wilson Creek sub-basin.
- Leaking or broken sewer lines or operational failures at the Kittitas sewage treatment plant could also discharge human waste to area water bodies.
- Travelers and recreational users occasionally leave human waste alongside or near waterways.

Livestock:

- Livestock deposit waste directly in streams, when crossing or standing in the stream.
- Livestock waste is washed into water bodies by surface flows.
- When livestock walk through water bodies, they may cause re-suspension of FC (note that these livestock may or may not be the original source of the re-suspended FC).

Wildlife:

- Wildlife deposit waste directly in streams. This includes warm blooded animals that spend much of their lives in the water (e.g., ducks, geese, muskrats, otters, and beavers),

those that may walk cross or stand in the stream (e.g., elk and deer), and those who frequent areas above a stream (e.g., perching or nesting birds).

- Wildlife waste deposited on land is washed into water bodies by surface flows.
- When wildlife walks through water bodies, they may also cause re-suspension of FC.

Pollution sources and transport mechanisms are further outlined in Table 2.

Organizational Responsibilities, Roles, and Activities

Several groups will share the duty of putting plans into action in order to reduce FC pollution in the Wilson Creek sub-basin.

Organizational Responsibilities

Implementation of Best Management Practices:

Agriculture: The conservation agencies [the Kittitas County Conservation District (KCCD) and the Natural Resources Conservation Service (NRCS)] are the entities responsible for technical assistance, educational outreach, and (where possible) financial support to promote implementation of agricultural BMPs throughout the watershed. Additionally, the Kittitas County Water Purveyors (KCWP) will provide technical assistance, educational outreach, and financial support as funding allows. The Washington State University (WSU) Extension is promoting a public education program regarding animal feeding operations (AFOs) and concentrated animal feeding operations (CAFOs). The Washington State Department of Agriculture (WSDA) will inspect such operations and offer technical assistance to livestock managers regarding animal waste management. Livestock owners and managers are responsible for keeping livestock waste out of the sub-basin's waterways. Individual irrigators are responsible for implementation of irrigation BMPs (note that some irrigation BMPs may also reduce FC).

Municipal Stormwater: The city of Ellensburg is responsible for implementing numerous changes, both in installations and in practices, to comply with Phase II stormwater regulations. These changes should reduce bacteria inputs from the city of Ellensburg. (The city of Kittitas will also implement stormwater BMPs, as reasonably possible and appropriate.)

Pet Owners: Ecology, the city of Ellensburg and Kittitas County are responsible for administering a public education program to inform pet owners about proper management of pet waste. Owners of domestic pets are responsible for using appropriate pet waste disposal practices, to ensure that pet waste does not enter sub-basin waterways.

Streamside Property Owners: Ecology, the KCCD, and Kittitas County Public Health (KCPH) are responsible for administering a public education program for streamside property owners regarding using appropriate BMPs to prevent FC pollution. All individual landowners with shorelines are responsible for implementing BMPs that prevent anthropogenic FC contamination from their property, where appropriate. Individual homeowners who live adjacent to water bodies within the project area are responsible for avoiding actions that cause FC pollution. This includes ensuring that on-site septic systems are functioning properly and are not discharging untreated waste to nearby water bodies.

Monitoring: The KCWP are currently conducting water quality monitoring per grant agreement; the KCWP has monitored FC in the past and will likely continue in 2007. Challenges to monitoring include (1) lack of effective and affordable source tracking methods and (2) lack of identification of baseline conditions. Monitoring arrangements may be modified in future years. Ecology will be collecting data from a long-term ambient monitoring station near the mouth of Wilson Creek. Ecology will evaluate monitoring data and/or coordinate monitoring in 2010, 2015, and 2020 to assess TMDL success.

Data Management: Ecology is ultimately responsible for management of FC data collected relevant to this implementation plan. All data should be collected under an Ecology approved Quality Assurance Project Plan.

Other: KCPH is responsible for educating citizens of Kittitas County regarding the dangers of exposure to fecal coliform bacteria. Additionally, KCPH is responsible for responding to reports of malfunctioning or failing on-site septic systems or illegal/direct discharges when a written and signed complaint is filed in their office, and for providing technical assistance to landowners as they improve these systems. The Kittitas County Board of Health passed a resolution in March 2006 indicating its support for this TMDL (see Appendix C).

Ecology is the entity ultimately responsible for determining compliance with interim and final TMDL targets. Ecology will also continue to sponsor workgroup meetings; these meetings will occur at least annually until the final target date of the TMDL, with the purpose of discussing TMDL progress, exchanging BMP information, and related information.

Using the concepts noted above, Tables 1 and 2 below summarize potential sources of FC, as well as the groups that may be involved with implementation of appropriate BMPs to reduce the impact of these sources.

Organizational Roles

Table 1 lists the responsible entities and general actions each entity will contribute toward the implementation of the *Wilson Creek Sub-basin Bacteria TMDL*, to achieve the water quality improvement goals. The information listed in the table is in accordance with knowledge available at the time that the DIP is written. Actions will be undertaken as funding and staffing levels allow.

Note: Refer to the list of acronyms and abbreviations in Appendix B for assistance with Table 1, below.

Table 1: Key Groups (listed alphabetically) and Their Contributions.

Groups	Contributions
All shoreline landowners *(includes all commercial, residential, agricultural, city, state and federal enterprises)*	Avoid activities that can cause FC pollution. Ensure that on-site septic systems are functioning properly and not contaminating adjacent waterways. Protect riparian vegetation. Where possible and appropriate, restore riparian vegetation using native plants. Reduce livestock contact with water bodies.
Ecology	Distribute a brochure (in Spanish and English) regarding prevention of FC pollution.

Groups	Contributions
Ecology	Evaluate if the water quality samples at points of compliance meet the interim and final TMDL targets.
Ecology, City of Ellensburg, Kittitas County	Administer public education program to inform pet owners about proper management of pet waste.
Ecology, KCCD, Kittitas County	Administer public education program for streamside property owners regarding appropriate BMPs to prevent FC pollution, especially regarding proper maintenance of on-site septic systems.
Ecology, KCWP, KCCD	Determine if alternate or additional outreach efforts are needed.
Ecology, Technical Advisory Workgroup (TAW)	Complete the DIP.
Homeowners with waterfront property	Avoid actions that will cause FC pollution. Implement FC control BMPs.
Irrigation Entities (Districts and Companies)	Where possible and appropriate, implement BMPs to prevent entry of FC into area waterways.
Irrigators	Where possible and appropriate, implement appropriate sediment-reduction BMPs. Certain sediment-reduction BMPs can also help reduce FC.
KCCD and KCWP	Administer public education program for Wilson Creek sub-basin irrigators, and other landowners and resource users.
KCCD, NRCS and Ecology	Continue to fund agricultural BMP implementation for reduction of FC pollution. The KCWP will also lend assistance as funding allows.
KCCD, NRCS, KCWP, WSDA	Extend outreach efforts and technical assistance to all agricultural producers (irrigators, livestock managers, hobby farmers and others) in the watershed.
KCWP, KCCD, Ecology	Determine if changes in monitoring sites, tests or frequency are needed.
KCWP, KCCD, Ecology	Continue to monitor water quality of the watershed's surface waters (as possible given funding availability.)
Kittitas County	Administration of Critical Area Ordinances and Shoreline Master Programs.
Kittitas County Public Health	Educate citizens of Kittitas County regarding the dangers of exposure to human fecal coliform bacteria. Respond to reports of malfunctioning and failing on-site septic systems and illegal/direct discharges when a written and signed complaint is filed in their office. KCPH is also responsible for providing technical assistance to landowners as they improve such systems.
Livestock managers	Implement appropriate livestock management BMPs to avoid direct deposition of livestock manure into area waterways. Minimize runoff from pastures.

Groups	Contributions
Owners of domestic pets	Use appropriate pet management practices, to ensure that pet waste does not enter sub-basin waterways.
Technical Advisory Workgroup (TAW)	Identify future monitoring needs and funding sources, and develop strategy.
TAW	Research, recommend and evaluate new BMPs, determine appropriate types of locations for implementation.
TAW	Review if interim targets have been met, and if not, devise action plan to meet target. Review if final TMDL target has been met, and if not, identify new timeline and BMPs needed.

Activities

As stated previously, actions taken pursuant to the *Wilson Creek Sub-basin Bacteria TMDL* fall into two categories: BMP implementation activities and monitoring activities.

Table 2 describes BMP implementation activities by summarizing the possible primary sources of FC pollution, suggested actions to be taken to reduce or eliminate the pollution, groups responsible for implementing these actions, and milestones for completing the actions. Primary sources of FC pollution are warm-blooded animals (including humans) who are the original depositors of the waste material. The activities have been ranked in importance: activities ranked as high priority should be undertaken first to reduce FC pollution, followed by activities designated as medium and low priorities. Technical and financial assistance will be available from agencies as funding allows.

Table 3 is similar to Table 2, but addresses only secondary sources of FC pollution. Secondary sources of FC pollution include resuspension and regrowth of FC bacteria, and are usually found in sediments at the bottom of water bodies.

Monitoring activities are addressed in the "Monitoring Plan" section of this document and in Appendix F.

Table 2: Primary Sources of FC in the Wilson Creek Sub-basin, Recommended Actions, Milestones, and Groups Responsible for Implementation.

Source Group	Specific Source	Explanation	Mode of transport[1]	Actions	Priority [2]	Milestone(s)	Group	Performance measures	
								What	When
Human waste	Failing on-site septic systems	Home septic system is failing or inadequate, and untreated sewage seeps into adjacent waterway	Both	Information and education program	H	Inform public about septic system maintenance	Ecology, KCPH	One informational mailing each year, one article in newspaper each year. Hold one public workshop each year re: failing septic systems	Annually
				Identify inadequate / failing systems	H	Locate faulty systems	Waterfront property owners, Ecology	Faulty systems identified and reported to KCPH	As found
				Address failing septic systems through technical assistance, recommend financial assistance programs	H	Address all known failing septic systems	KCPH	All requested technical assistance provided re: replacement of failing on-site septic systems	As needed
								All repairs to existing septic systems tracked & reported	Annually
				Financial assistance for septic system repair and replacement	M	Provide zero- and low-interest loans (and grants where possible) to landowners	KCPH, Ecology	All loans awarded for septic system repair or replacement tracked, alls numbers reported	Annually
				Property owners repair/replace faulty systems	H	Fix all known faulty systems	Waterfront property owners	All known faulty systems fixed each year	Annually

[1] Mode of transport indicates how FC is transported to water body – can be *direct* (animal deposits waste directly into water), *indirect* (waste deposited on land and washed into water), or *both.*

[2] Priority indicates which projects should be addressed first with limited resources. H = high, M = medium, L = low.

Source Group	Specific Source	Explanation	Mode of transport[1]	Actions	Priority [2]	Milestone(s)	Group	Performance measures	
								What	When
Human waste (cont.)	Direct connections ("Straight pipes")	Incorrect connection of sewer lines to natural water bodies, storm drains or irrigation waterways	Direct	Identify & replace inadequate/faulty systems; in cities, can use smoke and dye tests on storm drains	H	Locate and remove direct connections	Landowners, Ecology	All direct connections removed as they are found	Ongoing
	Sewer lines	Sewer lines can break or leak; sewage seeps into water body	Direct	Maintain municipal sewer lines	H	Monitor and repair any sewer line leaks or blockages	City of Ellensburg, City of Kittitas	City sewer lines flushed and inspected each year, per city's schedule	Annually
	Waste-water treatment plant	Operational failure could occur at Kittitas wastewater treatment plant (though not anticipated)	Both	Continue to monitor FC in effluent.	H	Meet requirements of NPDES permit	City of Kittitas	Discharge Monitoring Reports (DMRs) submitted as required	Monthly
				Report limit violations and report problems (if any)	H	Meet requirements of NPDES permit	City of Kittitas	All NPDES violations and their resolutions reported to Ecology	Ongoing

Source Group	Specific Source	Explanation	Mode of transport[1]	Actions	Priority[2]	Milestone(s)	Group	Performance measures	
								What	When
Domestic Animals	Pets	Animals deposit waste near waterways, waste is transported into water via overland flows	Indirect	Collect and properly dispose of any pet waste that can pollute a water body	M	Educate public re: pet waste	Ecology, City of Ellensburg, Kittitas County	1 set of educational materials re: pet waste management provided to all residents of Wilson Cr Sub-basin each year	Annually
						Provide way to properly dispose of pet waste	City of Ellensburg, WA State Parks	Pet waste collection bags are available at all parks in sub-basin	Ongoing
		Landowner dumps pet waste into water body	Direct	Dispose of waste properly	H	Educate public re: pet waste disposal and state WQ laws	Ecology, City of Ellensburg, Kittitas County	No pet waste is dumped in water bodies	Annually
						Pet waste properly disposed of	Pet owners	No pet waste is dumped in water bodies	Always
	Livestock	Provide education, technical and financial assistance to livestock managers	N/A	Increase awareness among livestock managers	H	Educational mailings	Ecology, KCCD, WSU Extension	1 educational mailing each year	Annually
						Workshops and meetings	Ecology, KCCD, WSU Extension	1 workshop or meeting re: FC reduction	Annually
						Provide specific technical and financial assistance re: BMPs to livestock managers	KCCD, NRCS, WSU Extension, KCWP	All livestock managers who seek help are given financial and technical assistance	Annually

Source Group	Specific Source	Explanation	Mode of transport[1]	Actions	Priority[2]	Milestone(s)	Group	Performance measures	
								What	When
Domestic Animals (cont.)	Livestock (continued)	Livestock deposit waste in waterways	Direct	Limit access to streams and reduce time livestock spend in all waterways	H	Prevent livestock from lingering in water bodies, using fencing (**riparian grazing**[3] may be used in some situations)	Livestock managers	10% more livestock managers use some type of FC reduction BMPs each year	Annually
		Livestock deposit waste on land, overland flows transport FC into water body	Indirect	Protect and/or revegetate riparian areas[4]	M	Healthy riparian areas filter runoff	Livestock managers	10% more livestock managers use some type of FC reduction BMPs each year	Annually
				Minimize runoff	M	Irrigated runoff from pastures is reduced	Livestock managers	10% more livestock managers use some type of FC reduction BMPs each year	Annually
		Landowner dumps manure into water body (as disposal method)	Direct	Use appropriate manure disposal BMPs	H	All livestock manure is properly disposed of	Livestock managers	All livestock manure is properly disposed of	Always

[3] For more information on riparian grazing, go to Appendix D
[4] Healthy riparian areas filter runoff through non-compacted soils, grasses and forbs

Source Group	Specific Source	Explanation	Mode of transport[1]	Actions	Priority[2]	Milestone(s)	Group	Performance measures	
								What	When
Wildlife	On land	Wildlife FC transported into water body during run-off events	Indirect	Provide education and financial assistance to area residents re: BMPs that will help reduce impacts on water bodies of land-deposited wildlife FC. BMPs include protection and revegetation of riparian areas[5]	L	Public education and financial assistance re: riparian protection / revegetation is provided	Ecology, KCCD, WSU Extension, WDFW	Number of land owners requesting technical /and financial assistance with riparian restoration	Report annually
								Number of presentations re: riparian restoration made at workshops	Report annually
				Implement municipal stormwater BMPs	L	Wildlife FC input from cities is reduced	City of Ellensburg, City of Kittitas	Compliance with municipal stormwater permit	As required by permit
	In/on/over water	Waterfowl, muskrats, birds and other warm-blooded animals defecate directly into water	Direct	Revegetation of riparian areas with tree/bushes can discourage use of water body by waterfowl	L	Increased protection and revegetation of riparian areas	Shoreline landowners	Number of landowners participating in riparian restoration using trees/bushes	Ongoing
				Don't feed wild waterfowl[6]	L	Wild waterfowl not fed as pets	Everyone	Wild waterfowl remain wild	Always
		Large game animals (e.g., elk) deposit manure into water bodies (canals and streams)		Provide off stream water for large game animals	L	Less entry of large game animals into streams	Big Game Management Roundtable, WDFW	Fewer large game animals linger in waterways	Ongoing

[5] Healthy riparian areas filter runoff through non-compacted soils, grasses and forbs also help with some filtration.
[6] Feeding wild waterfowl encourages these animals to remain in area

Source Group	Specific Source	Explanation	Mode of transport[1]	Actions	Priority[2]	Milestone(s)	Group	Performance measures	
								What	When
All	All	Some actions are consistent with all types of FC sources and transport mechanism	Both	Inform recreational users about FC pollution	H	Educate recreational users of local water bodies re: FC pollution in streams	Ecology, KCPH	Two educational events and/or mailings each year	Annual
				Issue NPDES and state permits (including stormwater)	H	Issue permits for all discharging facilities with limits to protect water quality	Ecology	Where possible, all required permits are issued	As needed
				Conduct TMDL effectiveness monitoring	M	Demonstrate that FC reductions are occurring	Ecology and partners	All appropriate samples are collected and analyzed for FC and *E. coli*; implementation information collected.	2010, 2015, 2020
				Hold implementation progress meetings	M	Track implementation progress and coordinate efforts between organizations	Ecology	Implementation progress is documented on a regular basis	Annually or as needed

Source Group	Specific Source	Explanation	Mode of transport[1]	Actions	Priority[2]	Milestone(s)	Group	Performance measures	
								What	When
Unknown	Unknown	Not all sources of FC are clearly identified; also relative contribution of sources not known with precision	Both	Identify sources through microbial source tracking (MST), if necessary	M	Investigate MST labs and methods for identifying any remaining unknown sources	Ecology, other interested parties	Latest advances in MST are consistently researched and distributed to interested parties	When available
							Ecology	TMDL workgroup is reconvened as needed, to learn about MST methods	When available
						Conduct selected MST method	To be determined by step above	When approved by Ecology, MST research is conducted in areas of unknown sources	When needed
				Identify sources through water quality sampling	M	Monitor stream segments to narrow sources within 5 years	Ecology, other groups	FC densities monitored and findings reported, as required	By 2011

Table 3: Secondary Sources of FC in the Wilson Creek Sub-basin, Recommended Actions, Milestones, and Groups Responsible for Implementation.

Source Group	Specific Source	Mode of transport[1]	Explanation	Priority [2]	Actions	Milestone(s)	Group	Performance measures	
								What	When
Resuspension / Regrowth of Bacteria In Waterways	Domestic animals walking in water body	Direct	Stirs up sediment and disturbs bacteria in bottom sediments, transports bacteria	M	Limit access to streams and reduce time livestock spend in all waterways	Educate public re: benefits of keeping domestic animals out of water bodies	KCCD, KCPH, Ecology, KCWP, WSU Extension	Better public understanding of importance of livestock management BMPs	Ongoing
						Prevent livestock from lingering in water bodies, using fencing (riparian grazing[3] may be used in some situations). Limit domestic animal use of water bodies	Livestock owners, pet owners	10% more livestock managers use some type of FC reduction BMPs each year	Ongoing
	Wildlife walking in water body	Direct	Large game animals (e.g., elk) stir up sediment, transports bacteria	L	Provide off stream water for large game animals	Less entry of large game animals into streams	Big Game Management Roundtable, WDFW	Fewer large game animals linger in water bodies	Ongoing
	Water crossings (vehicles or livestock)	Direct	Stirs up sediment, transports bacteria	L	Limit water crossings with vehicles	Educate public re: avoiding driving vehicles in water bodies unless absolutely necessary	All	Public reduces water crossings with vehicles	Ongoing

[1] Mode of transport indicates how FC is transported to water body – can be *direct* (animal deposits waste directly into water), *indirect* (waste deposited on land and washed into water), or *both.*

[2] Priority indicates which projects should be addressed first with limited resources. H = high, M = medium, L = low.

[3] Information and guidelines on riparian grazing can be found in Appendix D.

Measuring Progress Toward Goals

As noted earlier, the goal of the *Wilson Creek Sub-basin Bacteria TMDL* is to reduce levels of FC in order to meet TMDL targets (see Appendix A). These pollution reductions require improved pet and livestock management, identification and correction of failing on-site septic systems, and a decrease in contaminant levels in some agricultural return flows. Progress toward many of the TMDL goals can be measured using the milestones in Tables 2 and 3. The ultimate goal is to meet final targets by 2020.

Different implementation schedules will be used for different types of activities. Educational and outreach activities will proceed on a fairly regular schedule, depending on funding. BMP implementation actions will be undertaken in concert with landowner needs, abilities, and desires; supplemental funding may be used to accelerate implementation by landowners.

As stated earlier, Ecology is the entity ultimately responsible for determining compliance with interim and final targets. Ecology will continue to sponsor workgroup meetings. These meetings will occur at least annually until the final target date of the TMDL, with the purpose of discussing TMDL progress, exchanging and reviewing data and BMP information, trends and related information. If Ecology and the workgroup believe that progress toward goals is inadequate, then adaptive management strategies may be considered and initiated.

Schedules for achievement of milestones, by appropriate responsible groups, have been developed and placed at Appendix E. Over time, progressive milestones will be measured and tracked using these schedules. Tracking of progress toward goals will be coordinated by Ecology, with assistance from the other responsible groups identified earlier (see Table 1).

Monitoring Plan

Monitoring is included as part of the implementation strategy. It serves to track and evaluate the effectiveness of implementation measures. Several monitoring procedures, to be implemented concurrently, are described below. A detailed monitoring plan is provided in Appendix F.

KCCD and KCWP monitoring and studies in the Wilson Creek sub-basin have been vital for identifying water quality problem areas. These two groups should continue to work together and may want to become the core of a monitoring clearinghouse in the basin. The clearinghouse would encourage close coordination with Ecology, the U.S. Geological Survey (USGS), and other monitoring performed by government or private groups. Staff from Central Washington University should also be encouraged to participate.

Monitoring Needs Identified during the Course of the TMDL Evaluation

1. During the target years (2010, 2015 and 2020), re-assessment of FC levels in the Wilson Creek sub-basin.

2. In concert with Ecology, determine an appropriate method for additional microbial source tracking in the Wilson Creek sub-basin. When method is identified, use well-designed studies to clearly pinpoint bacteria sources.

Effectiveness Monitoring

Ecology has established an Effectiveness Monitoring group that will assist in determining the effectiveness of BMPs applied as a result of a TMDL. This group will periodically select waters where TMDLs have been in place, and evaluate the status of the waters toward achieving the load allocations and water quality standards. This information will be processed through the regional office to the applicable groups engaged in implementation activities.

The purpose of effectiveness monitoring is to provide assurance that control measures put in place during TMDL implementation achieve the expected load reductions. Ecology is responsible for determining, through effectiveness monitoring, the status of water bodies subsequent to the development and implementation of each TMDL. The timing of this monitoring is dependent upon the type of pollution parameter addressed, the period after which positive results should be identifiable, and the availability of resources. Effectiveness monitoring priorities will be selected by Ecology's Central Regional Office and verified through the annual scoping process.

In order to be thorough in accomplishing this task, Ecology monitoring personnel will follow a review sequence. The sequence will include consultations with the original author of the TMDL technical assessment to determine critical parts of the implementation plan and to verify critical locations. They will also contact the regional office TMDL coordinator to learn the results of implementation monitoring and the status of the TMDL implementation plan. Both monitoring and regional staff will make an effort to identify a local partnership to assist with data collection. On completion of these steps, an examination of the resulting data will be made and a water quality status determination will be announced for the water body in an advisory memorandum followed by a technical report.

Reasonable Assurance

Overview

When establishing a TMDL, reductions of a particular pollutant are allocated among the pollutant sources (both point and nonpoint sources) in the water body. TMDLs (and related DIPs) must show "reasonable assurance" that the nonpoint sources will meet their allocated amount of reductions. Among the appropriate types of reasonable assurance for this bacteria TMDL are implementation of BMPs, developing and implementing nonpoint source control plans, and greater public awareness of related legal encouragements to remediate water quality problems.

In the Wilson Creek sub-basin, the local workgroup has recommended establishing an inventory of current conditions and considers this a high priority. Funding sources and technical support exist and additional resources will be sought to support these activities. Government requests for funding from other sources concerning programs and actions to reduce FC pollution in the sub-basin will be shared with municipalities, local agriculturalists and other property owners in an effort to gain the maximum possible consensus to the best and most economical solutions. In addition, existing rules, ordinances, and agreements address the protection of riparian buffer zones over the area covered by the *Wilson Creek Sub-basin Bacteria TMDL*. Adaptive management may be used if compliance with TMDL targets does not occur. The proposed monitoring will track progress and identify whether additional measures are needed.

Current Implementation Efforts

Many local residents, the KCWP, the KCCD, the NRCS and others are already implementing bacteria reduction activities. Specific examples of recent restoration activities include the following:

- Many Wilson Creek sub-basin irrigators have performed irrigation upgrades, thereby reducing pollutant loading in return flows or eliminating surface water irrigation return flows altogether.
- Some open irrigation ditches have been replaced with pipe, to conserve water and increase instream flows. This piping should also reduce FC levels.
- The NRCS is currently implementing the 2002 Farm Bill, which includes a number of cost share programs. The largest is the Environmental Quality Incentives Program (EQIP), which can provide cost share funding for irrigation upgrades, piping and numerous other FC reduction BMPs.
- Many irrigators are using polyacrylamide (PAM) to reduce pollutants in irrigation return flows; Kittitas County Public Works and the Washington State Conservation Commission have provided cost-share funding for PAM. While mainly intended for sediment reduction, use of PAM also reduces FC levels.
- The Irrigation Efficiencies Program, administered by the KCCD, will help fund upgrades of irrigation equipment in exchange for placing saved water rights in a water trust.

- The Yakima Tributaries Access and Habitat Project (YTAHP), is administered by the South Central Washington Resource Conservation and Development Office. Other project participants include the KCWP, KCCD, the North Yakima Conservation District, Washington Department of Fish and Wildlife, and the Ahtanum Irrigation District. Projects resulting from YTAHP include converting from flood to sprinkler irrigation and riparian revegetation.
- The KCWP, a consortium of Kittitas County irrigation districts, irrigation companies, and creek diverters, has identified as one of its primary goals: "participation in local and regional efforts that support Clean Water Act compliance for water purveyors and irrigated agriculture." The KCWP has been awarded funding, through the 319 grant process, to educate local citizens, especially the agricultural/ranching community, about the need to improve water quality when and where possible. Funds are also available for landowners to install certain BMPs, such as fencing, water gaps and riparian vegetation.
- The city of Ellensburg is implementing stormwater BMPs, as required by the municipal stormwater rules.
- WSU Extension has developed a statewide partnership to educate livestock owners about the new CAFO rules, how to tell if "you are a CAFO" and where a producer can seek information to correct problems. The primary objective of this project is to provide technical assistance for producer practices that lead to the protection of water quality, improved animal health, and increased operating profits (WSU Extension, 2005). The statewide educational partnership includes Ecology, WSDA, the Washington State Conservation Commission, EPA, NRCS, the Washington Cattlemen's Association, and the Washington State Dairy Federation.
- The KCCD has developed a cost-share livestock grants program to assist livestock operations with facility upgrades in order to meet water quality standards. Priority consideration will be given to CAFOs, and to AFOs that could become CAFOs.
- The KCCD and WSU Extension jointly hold a series of small landowner workshops that help educate landowners regarding water quality issues, pasture management, and the like. These workshops are held annually.

Adaptive Management

If planned implementation activities are not producing expected or required results, Ecology or other entities may choose to do additional studies to identify the significant sources of FC pollution to the Wilson Creek sub-basin. If the causes are found to be largely anthropogenic in origin, and the remedies are required by already-existing laws or legal agreements, then additional implementation measures will be needed. If the causes cannot be determined, or if the causes are found to be largely naturally occurring, then the TMDL targets may need to be revised. This TMDL will be re-evaluated at the interim and final target dates (2010, 2015 and 2020). If progress toward reduced FC levels is slower than expected, then the TMDL may be modified.

Supporting Regulations, Legal Agreements, and Enforcement

Several laws, regulations, legal agreements, and land management plans support the efforts of this DIP by guiding riparian area activities on lands under a variety of property ownership. These include the Kittitas County Critical Areas Ordinance, Title 17A (certain sections cover riparian habitat areas on non-federal lands in Kittitas County); the Shoreline Management Act (covers shore lands within 200 feet of rivers, on non-federal lands); and Washington State water quality laws and regulations (covers water quality in all water bodies in the basin).

Washington's Water Pollution Control Act (Chapter 90.48 RCW) provides broad authority to issue permits and regulations, and prohibits all discharges of pollutants to water. The act declares that it is the policy of the state to maintain the highest possible standards to ensure the purity of all waters of the state and to require the use of all known, available, and reasonable means to prevent and control water pollution. The act defines waters of the state and pollution and authorizes Ecology to control and prevent pollution, and to make and enforce rules, including water quality standards.

Therefore, while education, outreach, technical and financial assistance will be used to the maximum extent to achieve voluntary compliance, this plan also acknowledges that enforcement is another tool. Additionally, where noncompliance poses an immediate and critical threat to human health, enforcement may be more urgent.

Public Involvement

The development of this DIP has involved the public every step of the way. The TMDL workgroup made many contributions to this DIP document, and also reviewed and edited three draft versions of the document. The timelines for implementation activities have been created in consultation with all of the landowners, agencies and organizations involved. Earlier versions of this document have been presented to all agencies with responsibilities outlined for comment prior to publication. TMDL workgroup meetings regarding this DIP were held in November 2005 and July 2006, and a public comment period was held during September and October of 2006 (see Appendix G).

During the entire TMDL implementation period, monitoring data and status reports will be available for public review, and periodic updates will be provided to area media and other interested parties.

Funding Opportunities

Numerous funding sources are available to continue the work of FC pollution reduction in the Wilson Creek sub-basin. For example:

- The NRCS often provides cost-share funding to agricultural producers for farm plan implementation and conservation improvements via EQIP. The NRCS can also provide cost-share funding to growers through the Conservation Reserve Enhancement Program (CREP), the Continuous Conservation Reserve Program (CCRP) and the Wildlife Habitat Incentives Program (WHIP).
- The KCCD provides cost-share funding for natural resource improvements. All KCCD cost share programs are associated with other funding sources, such as Kittitas County (PAM cost share program), the Bonneville Power Administration, the Salmon Recovery Funding Board, Conservation Commission, the Mid-Columbia Regional Fisheries Enhancement Group, the National Fish and Wildlife Foundation, Ecology's water metering program, Ecology's Water Infrastructure Grant Program, and water quality improvement grants from Ecology.
- Ecology funds water quality facilities and activities through its water quality grants program.
- The Yakima River Basin Water Enhancement Program (YRBWEP) has also provided considerable funding for irrigation efficiency upgrades and acquisition of critical habitat and will likely do so in the future.

As noted earlier, private individuals and organizations have also contributed significantly to restoration of the Wilson Creek sub-basin through considerable private financial expenditures as well as donation of many hundreds of hours of volunteer time. Ecology greatly appreciates this support and hopes that it will continue in the future, as is possible based on means and capability. Multi-source funding is preferred where possible.

References

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U.S. Environmental Protection Agency (EPA). 1997. Memorandum of agreement between the United States Environmental Protection Agency and the Washington State Department of Ecology regarding the implementation of Section 303(d) of the federal Clean Water Act. http://www.ecy.wa.gov/programs/wq/tmdl/303moa12.pdf

APPENDIX A

TMDL Targets

Appendix A: TMDL Targets

First Interim Target: October 2010

During the critical condition period (April through October) of 2010, water samples[1] collected at each of the sampling locations identified in Table A-1 shall comply with the more stringent of either 1) a maximum geometric mean FC density of 500 cfu/100 ml[2] and a maximum 90% value FC density of 1,500 cfu/100 ml or 2) existing conditions[3] as illustrated in Table A-1.

Second Interim Target: October 2015

During the critical condition period (April through October) of 2015, water samples[1] collected at each of the sampling locations identified in Table A-1 shall comply with the more stringent of either 1) a maximum geometric mean FC density of 300 cfu/100 ml and a maximum 90% value FC density of 600 cfu/100 ml, or 2) existing conditions[3] as illustrated in Table A-1.

Final Targets: October 2020

During the critical period (April through October) of 2020, water samples[1] collected at each of the sampling locations identified in Table A-1 shall comply with a maximum geometric mean FC density of 100 cfu/100 ml and a maximum 90% value FC density of 200 cfu/100 ml.[4]

After all appropriate and practical BMPs have been implemented, then Ecology and the TMDL workgroup will reevaluate jointly whether standards are being met. If water quality standards are not being met, then stakeholders can evaluate whether they have sufficient information and a basis for seeking to change the standards, or stakeholders (including Ecology) can reevaluate the way existing standards (*e.g.*, natural conditions) apply to the watershed.[5]

In the future, microbial source tracking techniques are expected to develop to a point where they are more cost-effective and reliable, and their results are more widely accepted for quantitative purposes. As this happens, further source-tracking data will be collected to promote more efficient voluntary implementation of BMPs.

The success of this TMDL is primarily dependent on the willing cooperation of area stakeholders; in particular, livestock managers, irrigators, waterfront landowners, and city and county governments. Therefore, it is critical that a firm bond of trust be established between these stakeholders and Ecology, with the understanding that stakeholders and Ecology will work toward sustainable solutions[6] and the voluntary implementation of appropriate BMPs, as all parties work together to meet the targets of this TMDL.

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[1] "… water samples collected at each of the sampling locations identified in Table A-1 shall comply with ..." refers to performing the statistical analyses indicated on all of the samples collected at a given site for a given year and then determining whether or not the output of the statistical analyses meets the target for that year.

[2] cfu/100 ml = number of bacterial "colony forming units" per 100 milliliters of sample

[3] Note that some sites currently have FC densities that are already lower than the interim targets, and Washington State's antidegradation provisions (WAC 173-201A-070) require that the water body will not degrade below existing conditions.

[4] The final target is compliance with Class A water quality standards for FC.

[5] EPA contributed the language for this paragraph.

[6] See Appendix B for definition

Table A-1: Estimated Reductions in FC Densities Necessary to Meet Class A Water Quality Standards (from Table 4 in the TMDL submittal document (Creech and Bohn, 2005)).

Water body Name	Sampling Site Location	Geom. Mean During Critical Condition (cfu/100 ml)[18]	90% Value During Critical Condition (cfu/100 ml)	Target Reduction Needed at Sampling Site (to Meet Class A FC Standards)
Badger Creek	above confluence with Wipple Wasteway	292	1,400	67.7%
Bull Ditch	at Tjossem Road	488	3,000	80.9%
Caribou Creek	at S. Ferguson Road	428	4,000	78.5%
CID Canal	at Thrall Road	570	2,300	83.3%
Cherry Creek	at Moe Road	402	1,200	75.9%
Coleman Creek	at Moe Road	378	1,400	74.8%
Cooke Creek	at #81 Road	492	5,900	81.4%
Cooke Creek	at S. Ferguson Road	300	1,140	68.2%
EWC Canal	at Thrall Road	499	3,000	81.3%
Johnson Drain	at S. Ferguson Road	616	1,800	84.3%
Mercer Creek	at KRD Canal	319	2,640	71.0%
Naneum Creek	at Fiorito Pond	265	620	62.8%
Parke Creek	at S. Ferguson Road	328	5,940	72.2%
Whiskey Creek	at KRD Canal	263	2,500	65.0%
Wilson Creek	at Sanders Road	552	1,000	81.7%
Wilson Creek	at Thrall Road	248	720	60.9%
Wipple Wasteway	at Moe Road	235	720	58.9%

[18] "cfu/100 ml" = bacterial colony forming units per 100 milliliters of sample

APPENDIX B

Definitions and Acronyms

Appendix B: Definitions and Acronyms

Definitions

90% value	For the *Wilson Creek Sub-Basin Bacteria TMDL*, a 90% value is defined as that single data value which represents the beginning of the largest ten percent (10%) of data values after ranking all applicable data values, from highest to lowest. For example: if a data set contains 1 to 19 values, the 90% value shall be the largest value; if a data set contains 20 to 29 values, the 90% value shall be the second largest value; etc.
Adaptive management	A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.
Animal Feeding Operation (AFO)	A lot or facility where animals have been, are, or will be stabled, or confined and fed or maintained for a total of 45 days or more in any 12-month period. Crops, vegetation forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility. It is not necessary that the same animals be fed or maintained on the lot for the entire 45-day period nor do the 45 days need to be consecutive. [CFR 122.23]
Anthropogenic	Human-caused or of human origin.
Best Management Practices (BMPs)	Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources. For this TMDL, agricultural BMPs should be approvable by the Natural Resources Conservation Service (NRCS), Kittitas County Conservation District (KCCD) and/or Washington State University (WSU) Extension Service. BMPs not related to agricultural applications should be approvable by Ecology.

Definitions

Concentrated Animal Feeding Operation (CAFO)	A large CAFO is defined as: an animal feeding operation, which meets one of the following: Has at least: (1) 700 mature dairy cows, whether milked or dry; (2) 1,000 veal calves; (3) 1,000 cattle other than mature dairy cows or veal calves (cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs); (4) 2,500 swine each weighing 55 pounds or more; (4) 10,000 swine each weighing less than 55 pounds; (5) 500 horses; (6) 10,000 sheep or lambs; (7) 55,000 turkeys; (8) 30,000 laying hens or broilers, if the AFO uses a liquid manure handling system; (9) 125,000 chickens (other than laying hens), if the AFO uses other than a liquid manure handling system; (10) 82,000 laying hens, if the AFO uses other than a liquid manure handling system; (11) 30,000 ducks, if the AFO uses other than a liquid manure handling system; or (12) 5,000 ducks, if the AFO uses a liquid manure handling system.
	A medium CAFO is defined as: an animal feeding operation, (1) having pollutants discharged into the waters of the United States either through a made-made ditch, flushing system, or other similar man-made device; or (2) having pollutants discharged directly into water of the United States that originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation. Such AFO must also have: (1) 200 to 699 mature dairy cows, whether milked or dry; (2) 300 to 999 veal calves; (3) 300 to 999 cattle other than mature dairy cows or veal calves (cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs); (4) 750 to 2,499 swine each weighing 55 pounds or more; (5) 3,000 to 9,999 swine each weighing less than 55 pounds; (6) 150 to 499 horses; (7) 3,000 to 9,999 sheep or lambs; (8) 16,500 to 54,999 turkeys; (9) 9,000 to 29,999 laying hens or broilers, if the AFO uses a liquid manure handling system; (10) 37,500 to 124,999 chickens (other than laying hens), if the AFO uses other than a liquid manure handling system; (11) 25,000 to 81,999 laying hens, if the AFO uses other than a liquid manure handling system; (12) 10,000 to 29,999 ducks, if the AFO uses other than a liquid manure handling system; or (13) 1,500 to 4,999 ducks, if the AFO uses a liquid manure handling system.
	A designated CAFO is defined as: an animal feeding operation that is determined to be a significant contributor of pollutants to waters of the state and is found to have (1) pollutants discharged into the waters of the United States either through a made-made ditch, flushing system, or other similar man-made device; or (2) pollutants discharged directly into waters of the United States that originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation. Such AFO must not be classifiable as either a large or a medium CAFO.

Definitions

Critical Condition Period	That portion of the calendar year when the pollution parameter of interest demonstrates the greatest adverse impact on aquatic biota and existing or characteristic water uses.
Fecal Coliform (FC) Bacteria	Fecal coliform bacteria are bacteria present in the intestinal tracts .and feces of warm-blooded animals. FC is used as an indicator organism for the possible presence of disease-carrying (pathogenic) organisms.
Hobby Farm	A facility that is operated on a part-time basis with off-farm income being the principal income for the owner/operator. Such facility typically has only a few animals and very little cropland, but may have several acres of pasture. Such facility can have any combination of various types of animals (e.g., horses, cattle, sheep, llamas, goats). Any facility operated commercially shall not be considered a hobby farm.
Irrigation Return Flow	That portion of the applied irrigation water that is not consumptively used by crops or irretrievably lost to evaporation and transpiration, and which returns to a surface water or the groundwater.
Load Allocation	That portion of a receiving waters' loading capacity that is attributed either to one of its existing or potential non-point source of pollution or to natural background sources.
Loading Capacity	The maximum amount of the pollutant parameter loading that a receiving water can absorb without violating the respective state water quality standard.
Margin of safety	A required element of a TMDL that is meant to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality.
Nonpoint source	Nonpoint source pollution is the single largest source of water pollution nationwide, and refers to pollution that enters any waters of the state from any dispersed land-based or water-based activities. Nonpoint source pollution can include, but is not limited to: atmospheric deposition; surface water runoff from agricultural lands, urban areas, or forest lands; or subsurface or underground sources.
Numeric criteria	Specific, quantitative limits that are applied to specific conditions and sets of circumstances.
Point source	Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged (e.g., an industrial facility's discharge pipe.) See Section 502 of the Clean Water Act.
Riparian Grazing	A livestock management practice that allows grazing within a fenced riparian area for a short time during the growing season (*see Appendix D for specific recommendations*)

Definitions

Riparian zone (or "riparian area")	1. The land area and associated vegetation bordering the bank of a river or other body of water; 2. A transition zone between dry land and water communities; 3. The zone of direct interaction between terrestrial and stream systems.
Seasonal variation	The change in pollution levels from one season to the next.
Sustainable	Environmentally and economically sound, and socially acceptable
Wasteload Allocation	That portion of a receiving waters' loading capacity that is allocated, or attributed, to existing or potential point sources of pollution.
Water column	Vertical section of a water body.

Acronyms and Abbreviations

303(d) list	Washington State's list of impaired water bodies (as required by Section 303(d) of the Clean Water Act)
AFO	animal feeding operation
BGMR	Big Game Management Roundtable
BMPs	best management practices
CAFO	concentrated animal feeding operation
CCRP	Continuous Conservation Reserve Program
cfu	colony forming units
CID	Cascade Irrigation District
CREP	Conservation Reserve Enhancement Program
CWA	Clean Water Act
DIP	detailed implementation plan
E. coli	Escherichia coli
Ecology	Washington Department of Ecology
EPA	United States Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
EWC	Ellensburg Water Company
FC	fecal coliform
KCCD	Kittitas County Conservation District
KCPH	Kittitas County Public Health
KCWP	Kittitas County Water Purveyors
KRD	Kittitas Reclamation District
LA	load allocation
ml	milliliter(s)

Acronyms and Abbreviations

MOS	margin of safety
N	number of samples
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PAM	polyacrylamide
POTW	publicly-owned treatment works (wastewater treatment plant)
RCW	Revised Code of Washington
RNA	ribonucleic acid
SIS	summary implementation strategy
state	Washington State
TAW	technical advisory workgroup
TMDL	total maximum daily load
USGS	United States Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WHIP	Wildlife Habitat Incentives Program
WLA	wasteload allocation
WRIA	Water Resource Inventory Area
WSDA	Washington State Department of Agriculture
WSU	Washington State University

APPENDIX C

Kittitas County Board of Health Resolution

Appendix C: Kittitas County Board of Health Resolution

BOARD OF HEALTH
COUNTY OF KITTITAS
STATE OF WASHINGTON

RESOLUTION NO. 2006-01

A Resolution Supporting the Washington State Department of Ecology's Water Clean-Up Plan for the Wilson Creek Sub-Basin

WHEREAS: Kittitas County residents enjoy a history of recreational water use in local rivers, streams and irrigation ditches, including the creeks that form the Wilson Creek Sub-Basin and irrigation ditches which flow through city parks and residential areas into this Sub-Basin, and

WHEREAS: Wilson Creek Sub-Basin Creeks and Kittitas County irrigation ditches still provide an aesthetic value to the citizens of Kittitas County and are an important asset to the farmers in the Kittitas Valley, and

WHEREAS: The Wilson Creek Sub-Basin drains into the Yakima River, and

WHEREAS: The Washington State Department of Ecology released publication 05-10-041 in June 2005 indicating that higher than normal human fecal coliform levels were found in the Wilson Creek Sub-Basin Total Maximum Daily Load, and

WHEREAS: The Kittitas County Board of Health and Health Department staff desire to address the potential health issues implied in the Washington State Department of Ecology's Wilson Creek Sub-Basin Total Maximum Daily Load report regarding exposure to higher than normal human fecal coliform levels in the water, and

WHEREAS: It is the mission of the Kittitas County Public Health Department to protect and promote the health and the environment of the people of Kittitas County,

BE IT THEREFORE RESOLVED: The Kittitas County Public Health Department supports the Washington State Department of Ecology's efforts to reduce fecal coliform levels in the Wilson Creek Sub-Basin by:

1. Educating the residents of Kittitas County of the dangers of exposure to human fecal coliforms when standing, swimming or recreating in the Wilson Creek Sub-Basin and all creeks and irrigation ditches that feed the Sub-Basin, and
2. Correcting septic system issues along the Wilson Creek Sub-Basin as they are reported; and

BE IT FURTHER RESOLVED: The Kittitas County Board of Health supports and encourages the citizens of Kittitas County to pursue and participate in all environmental health educational opportunities related to recreational use of Wilson Creek and Kittitas County irrigation ditches and to exercise caution when recreating in close proximity to said creek and ditches.

DATED this 16th day of March, 2006, at Ellensburg, Washington.

BOARD OF HEALTH
KITTITAS COUNTY, WASHINGTON

David B. Bowen, Chair

Don Solberg, MD, Vice Chair

Perry D. Huston, Board Member

Carolyn Booth, Board Member

Alan A. Crankovich, Board Member

Clerk of the Board

APPENDIX D

Riparian Grazing Guidelines

Appendix D: Riparian Grazing Guidelines

Riparian Pasture Management Guidelines

"Riparian pasture management" refers to the livestock management practice where livestock graze a riparian area[1] for a planned (usually short) time period during the growing season. If used properly, riparian grazing is a valuable natural method of managing riparian vegetation. A livestock manager wishing to use this technique should begin by contacting a local range specialist for site-specific guidance. Note: The guidelines listed below are *general* recommendations for riparian pasture grazing, and are intended to give a producer an overview of riparian grazing practices *before* contacting the range specialist.

1) **Riparian grazing plan needed**. A livestock manager should have a site-specific riparian pasture management plan in place before initiating riparian grazing. The plan should be written with the help of a range specialist, who will visit the riparian pasture and offer specialized advice for the proper management of this pasture. Contact the WSU Extension Service, the Natural Resources Conservation Service (NRCS) or your local Conservation District office to locate a range specialist in your area[2]. The riparian grazing plan does not have to be lengthy, but should include at least these items:

    - Long term goals and objectives for the riparian pasture
        - Desired plant community at this site
        - Streambank stability
        - Slope of streambank
    - Monitoring vegetation during riparian grazing
        - Key plant species to monitor
        - Minimum vegetation height
    - Length of grazing time
    - Time of year when grazing will occur
    - Type of livestock animals
    - Animal density (number of animals)
    - How soon riparian grazing can start after replanting
    - Water source for livestock

    The plan should be written to ensure protection of water quality and riparian habitat. If the local conservation district (or other group) will cost-share the fencing and riparian restoration, then the funding group may wish to hold a copy of the riparian grazing plan.

[1] A "riparian area" is the transitional zone between the aquatic and terrestrial (or upland) environment, and occurs as a "belt" along the side of a river, stream, lake or pond.

[2] Contact information for range specialists in Kittitas County:

- Tip Hudson (WSU Extension Service) – (509) 925-7507, hudsont@wsu.edu
- Sarah Troutman (NRCS) – (509) 925-8585 X3, sarah.troutman@wa.usda.gov
- Mark Crowley (Kittitas County Conservation District) – (509) 925-8585 X4, mark-crowley@wa.nacdnet.gov

Length of grazing period is critical. Riparian pasture grazing is often called "flash" grazing, to emphasize that the animals are usually allowed to graze on the riparian pasture for only a short period (a few hours to a few weeks, depending on the situation). As with other elements of the grazing plan, length of the grazing period will vary from site to site. The length of the grazing period must be carefully planned with your range specialist in order to protect sensitive vegetation and prevent overgrazing and damage to the stream corridor.

2) **Size of riparian pasture is important.** A fenced riparian pasture must be large enough to manage well. Your range specialist can give you specific guidance on how far your fence should be from the edge of the water body in order to allow riparian grazing.

3) **Monitor vegetation during riparian grazing.** To prevent overgrazing in the riparian area, the producer must closely observe the vegetation within the riparian area during riparian grazing. The producer should carefully check the vegetation at least once each day during riparian grazing. Grass stubble should be no shorter than about 3 to 6 inches (depends on grass species, ask your range specialist) – be sure to leave enough stubble to trap sediment during high stream flows or from overland flows. Other key plant species within the riparian area should be monitored as well. If there is any sign that the livestock are causing undesired damage to the trees and shrubs, then the livestock should be removed immediately.

4) **Monitor stream corridor during riparian grazing.** In order to protect water quality, livestock should be removed from the riparian pasture as soon as there are significant signs that they have been in the stream corridor (i.e., streambanks and stream itself). Signs of heavy stream corridor use can include muddy areas, manure, animal trails along stream, and so on.

5) **Choose livestock animals for riparian grazing based on long term goals.** Cattle are often used for riparian grazing. Other animals to consider are goats, horses and sheep. Animal choice will be based on protecting the plants you wish to promote in the riparian pasture, the size of the riparian pasture and the impact of the animals on the streambanks – your range specialist can assist you with this choice.

6) **Time of year is important**. Spring riparian grazing usually causes the least damage to shrubs and small trees in the riparian area, because the grasses are greenest in the spring and the livestock are less likely to browse on woody vegetation. However, before spring riparian grazing occurs, the soil should be firm enough to prevent soil compaction and damage to the soil structure – so spring riparian grazing should usually occur well after spring snowmelt and spring rains (again, your plan will be site-specific, so confirm timing with your range specialist). The producer will also need to carefully monitor summer and fall grazing in riparian areas in order to avoid undesired results.

7) **If the riparian area was recently replanted, avoid riparian grazing for long enough to establish the new plants.** If the newly-planted riparian trees and shrubs are small, the livestock will harm them. Therefore, the producer will often wait a significant period (usually years, see below) before initiating any riparian grazing in a recently replanted area.

However, the timing on the start of riparian grazing after replanting will be site-specific, as identified in the riparian pasture management plan.

During the early growth period, the producer should manually clip grasses, mulch, etc. around newly planted plants and clip/spray any weeds, until the riparian shrubs have grown to a desirable height (may be ~3 feet tall – depends on species). The riparian trees and shrubs must be well established in order to survive the stress placed on them by livestock and by the very dry summers typical of lands east of the Cascade Mountains.

Below are general guidelines for beginning riparian grazing after replanting (may vary in your site-specific grazing plan):

a) Some carefully monitored *spring* riparian grazing may be started a reasonable time after replanting, if the new trees and shrubs are growing well and the streambank is stable (use judgment here: a common rule of thumb is to start spring riparian grazing in Year 3 after replanting);

b) Carefully monitored *summer* riparian grazing may be added in about Years 4 or 5 following riparian enhancement work; and

c) *Fall* riparian grazing should generally not be added until a few years after summer grazing has been successful.

Note: In *some* irrigated areas, there is less fluctuation in summer moisture availability, allowing riparian vegetation to grow more robustly and stay greener throughout the irrigation season (as compared to non-irrigated areas). Therefore, under certain circumstances, a producer may be able to begin carefully-monitored post-replanting *summer* riparian grazing in irrigated areas somewhat earlier than indicated above. In any case, be sure that post-replanting *spring* riparian grazing has been successful (i.e., prevention of damage to protected plant species) before attempting *summer* riparian grazing. Again, this should be carefully planned with your range specialist.

If the streambank has been severely degraded, it may take several years after riparian planting and fence installation before the streambank has stabilized enough to withstand riparian grazing. This depends upon the site – for example: areas with severely eroded streambanks, previously covered only with grasses that were heavily grazed, may need to be protected from grazing for a longer period.

In all cases, the producer should use good judgment to protect the investment (time and money) in the riparian restoration.

8) **Assess riparian area before riparian grazing**. One way to determine whether the riparian area is ready for riparian grazing is to conduct an appropriate assessment (for example, proper functioning condition) that looks at streambank stability, soils, and vegetation. The range specialist can also help assess your riparian area during the site visit.

9) **Watering site needed inside riparian area.** Ideally, there should be an armored watering site (or an off-stream water source) available to the livestock during riparian grazing. This will prevent the livestock from breaking down the streambanks.

10) **Not all riparian areas are appropriate for riparian grazing.** In certain locations and situations, the riparian area should be fenced off and never grazed. For instance, certain sensitive wetlands should not be grazed (your range specialist can help you identify these).

11) **Periodically assess progress toward achieving long term plan.** At least annually, the livestock manager should evaluate whether or not the condition of the riparian pasture is getting closer to the desired state, as identified in the riparian pasture management plan. Are the desirable plant species thriving? Are stream banks stable?

APPENDIX E

Schedules and Tracking

Appendix E: Schedules and Tracking

This Appendix attempts to predict and project future FC-reduction successes in the Wilson Creek sub-basin. The following tables take a conservative estimate of implementation that is reasonably expected to occur during the life of this TMDL (2005-2020), based on planning and funding sources that have been identified and secured at the time this document was completed. This plan can be changed if there is a reasonable basis with mutual consent from the *Wilson Creek Sub-basin Bacteria TMDL* technical advisory workgroup and Ecology.

1) **Public Education Program.** Several local groups (KCCD, KCPH, City of Ellensburg, KCWP, WSU Extension, NRCS, Kittitas County, and Ecology) will participate in a public education program for Wilson Creek sub-basin landowners and resource users. These organizations will hold educational meetings and prepare and mail educational items each year regarding ways to reduce FC pollution in sub-basin waterways. The mailings and meetings will address these topics (but not necessarily all at the same time): awareness of high bacteria levels in area waterways for recreational users; identification and repair/replacement of failing home septic systems; responsible disposal of pet waste; livestock management methods that can reduce FC input to water bodies; and protection/revegetation of riparian areas.

Table E-1: Public Education Program.

Year	Educational Items Mailed		Percent Achievement	Educational Activities		Percent Achievement
	Goal	Results		Goal	Results	
2006	2 items			2 activities		
2007	2 items			2 activities		
2008	2 items			2 activities		
2009	2 items			2 activities		
2010	2 items			2 activities		
2011	2 items			2 activities		
2012	2 items			2 activities		
2013	2 items			2 activities		
2014	2 items			2 activities		
2015	2 items			2 activities		
2016	2 items			2 activities		
2017	2 items			2 activities		
2018	2 items			2 activities		
2019	2 items			2 activities		
2020	2 items			2 activities		

2) **Implementation of FC-Reduction Best Management Practices (BMPs) by Landowners.** Landowners will implement appropriate BMPs to reduce FC in water bodies in the project area.

Table E-2: Implementation of FC Reduction BMPs for Landowners.

Year	Percentage of Waterfront Landowners using BMPS to Reduce FC in Adjacent Water Bodies		Percent Achievement	Miles of Shoreline Projected		Percent Achievement
	Goal	Result		Goal	Result	
2006	10% of all shoreline homeowners (???)			10 miles of shoreline (???)		
2007						
2008						
2009						
2010						
2011						
2012						
2013						
2014						
2015						
2016						
2017						
2018						
2019						
2020						

3) **Implementation of Municipal Stormwater BMPs.** The city of Ellensburg will implement appropriate municipal stormwater BMPs, as required under the stormwater rules. (The city of Kittitas will also implement stormwater BMPs, as possible and appropriate.)

Table E-3: Implementation of Municipal Stormwater BMPs.

Year	Percentage of Municipal Stormwater BMPs Implemented by City of Ellensburg		Percent Achievement	Percentage of Municipal Stormwater BMPs Implemented by City of Kittitas		Percent Achievement
	Goal	Result		Goal	Result	
2006	All required BMPs implemented			Implement if possible		
2007	All required BMPs implemented			Implement if possible		
2008	All required BMPs implemented			Implement if possible		
2009	All required BMPs implemented			Implement if possible		
2010	All required BMPs implemented			Implement if possible		
2011	All required BMPs implemented			Implement if possible		
2012	All required BMPs implemented			Implement if possible		
2013	All required BMPs implemented			Implement if possible		
2014	All required BMPs implemented			Implement if possible		
2015	All required BMPs implemented			Implement if possible		
2016	All required BMPs implemented			Implement if possible		
2017	All required BMPs implemented			Implement if possible		
2018	All required BMPs implemented			Implement if possible		
2019	All required BMPs implemented			Implement if possible		
2020	All required BMPs implemented			Implement if possible		

4) **Livestock Managers Will Implement FC-Reduction BMPs.** Livestock managers will reduce FC pollution of waterways in the Wilson Creek sub-basin by preventing constant exposure of waterways to cattle (fencing or other methods), reducing runoff from pasture into waterways, and protecting existing riparian vegetation. Financial and/or technical assistance will be available from NRCS, KCCD, KCWP, WSU Extension, WSDA and others.

Table E-4: Implementation of FC-Reduction BMPs by Livestock Managers.

Year	Percent of Livestock Managers Implementing FC-Reduction BMPs		Percent Achievement
	Goal	Result	
2006			
2007			
2008			
2009			
2010			
2011			
2012			
2013			
2014			
2015			
2016			
2017			
2018			
2019			
2020			

5) **Funding of Agricultural FC-Reduction BMPs.** EQIP funding levels may vary in coming years, due to shifts in federal funding. The KCCD also has funding for FC-reduction projects. The funding goals below are rough estimates.

Table E-5: FC-Reduction Funding Levels.

Year	Funding of Agricultural FC-Reduction BMPs		Percent Achievement
	Goal	Result	
2003	$500,000		
2004	$500,000		
2005	$500,000		
2006	$500,000		
2007	$500,000		
2008	$500,000		
2009	$500,000		
2010	$500,000		
2011	$500,000		
2012	$500,000		
2013	$500,000		
2014	$500,000		
2015	$500,000		
2016	$500,000		
2017	$500,000		
2018	$500,000		
2019	$500,000		
2020	$500,000		

6) **Location and Improvement of Failing Septic Systems on Waterfront Property.** Ecology will oversee a program to locate failing septic systems that are leaching into area waterways. This program will also locate direct wastewater discharges ("straight pipes") into waterways. KCPH will respond to reports of malfunctioning or failing on-site septic systems or illegal/direct discharges when a written and signed complaint is filed in their office. KCPH will also provide technical assistance to landowners as they improve these systems.

Table E-6: Location and Correction of Failing Septic Systems on Waterfront Property.

Year	Percentage of Failing Septic Systems and "Straight Pipes" Identified		Percent Achievement	Percentage of Identified Failing Septic Systems Corrected		Percent Achievement
	Goal	Result		Goal	Result	
2006	As many as possible					
2007				100%		
2008				100%		
2009				100%		
2010				100%		
2011				100%		
2012				100%		
2013				100%		
2014				100%		
2015				100%		
2016				100%		
2017				100%		
2018				100%		
2019				100%		
2020				100%		

7) **Pet Owners Implement BMPs for Pet Waste Management.** Pet-waste collection bags will be made available at all waterfront parks in the Wilson Creek sub-basin (Kittitas County and city of Ellensburg will install bag dispensers and supply bags; grant funding may be available). All pet owners will collect pet waste on property near water bodies and dispose of properly.

Table E-7: Pet Owners Implement BMPs for Pet Waste Management.

Year	Percent of Parks with Dog Waste Collection Bags Available		Percent Achievement	Percent of Dog Owners Properly Collecting and Disposing of Pet Waste		Percent Achievement
	Goal	Result		Goal	Result	
2006						
2007						
2008						
2009						
2010						
2011						
2012						
2013						
2014						
2015						
2016						
2017						
2018						
2019						
2020						

8) **Revegetation of Streambanks.** Replace damaged riparian vegetation – vegetated streambanks can 1) filter FC from runoff water through non-compacted soil and 2) may discourage waterfowl from using water). Planting of trees and shrubs, and subsequent maintenance to ensure survival, will be administered by waterfront property owners and livestock managers. Optimum survival of new plantings will be 90% survival after first year, 80% after second year, and 60% after five years. Technical and/or financial assistance will by provided by KCCD, KCWP, NRCS, WSU Extension and others.

Year	Revegetation of Streambanks		Percent Achievement	Survival of Plantings Along Streambanks		Percent Achievement
	Goal	Result		Goal	Result	
2006						
2007						
2008						
2009						
2010						
2011						
2012						
2013						
2014						
2015						
2016						
2017						
2018						
2019						
2020						

Table E-8: Revegetation of Streambanks

APPENDIX F

Detailed Monitoring Plan

Appendix F: Detailed Monitoring Plan

There are three levels of monitoring included in this plan: 1) ambient water quality, 2) implementation, and 3) source identification. Each is used to evaluate the adequacy of implementation of restoration measures [e.g., "best management practices" (BMPs)]. Every five years Ecology will prepare and publish a status of monitoring efforts and data. All water quality monitoring will be performed under a quality assurance project plan approved by Ecology.

Ambient Water Quality

Ecology continues to collect data from two ambient monitoring stations in the project area. The KCWP may continue monitoring for FC in the Wilson Creek sub-basin in 2007. In all cases, data will be compared to water quality standards after data is evaluated for correctness. Each sampling group is responsible for verification of their own data, while Ecology is ultimately responsible for overall data evaluation.

Implementation

The KCCD and the NRCS have been coordinating many of the implementation activities. Ecology will work with these agencies to provide frequent status reports of implementation.

Source Identification

Where water quality monitoring identifies particular stream reaches or other locations that often exceed standards for FC, efforts will be made to identify causes of the pollution. The KCWP and KCCD will work to identify these sites, to determine (if possible) whether the water quality violations are the result of human activities, and, where necessary, identify the specific land uses or management practices that may be causing the problem. Ecology may also begin an additional monitoring program for source identification in 2007. As appropriate, the KCWP, KCCD and NRCS will work with landowners to reduce pollution sources, with assistance from Ecology as needed.

All FC data (ambient, source identification and any other) collected for this TMDL will be made available to Ecology and the public in a timely manner. In general, the data collected during a given calendar year will be made available, following completion of appropriate quality assurance/quality control measures, by February 1 of the following year. All monitoring will follow a sampling plan (quality assurance plan) approved by Ecology. Other parameters such as dissolved oxygen, pH, discharge, temperature, suspended solids and turbidity will also be monitored as appropriate.

Monitoring stations, which have been established for FC monitoring, are described below in Tables F-1 and F-2.

Table F-1: KCWP Monitoring Stations for FC in the Wilson Creek Sub-basin.

Station Description	Longitude (West)	Latitude (North)

Table F-2: Ecology Monitoring Stations for FC in the Wilson Creek Sub-basin.

Station Name	Station Location	Latitude	Longitude

APPENDIX G

Summary of Responses to Public Comments

Appendix G: Summary of Responses to Public Comments

Ecology received written comments from one group on the draft detailed implementation plan document for the *Wilson Creek Sub-basin Bacteria TMDL.* This group is the Kittitas County Water Purveyors (KCWP)).

The KCWP letter is entered below, with responses from Ecology entered in appropriate places. The KCWP and Ecology have different font styles as noted below. A copy of the original letter is available on request from Ecology.

* * * * * * * * * * * * *

Kittitas County Water Purveyors
315 North Water Street
P.O. Box 276
Ellensburg, WA 98926

Dear Ms. Creech:

(KCWP statement) Thank you for the immense time and effort you and other Ecology staff have put into the creation of the Wilson Creek Sub-basin Bacteria Total Maximum Daily Load (TMDL) in general, and the Detailed Implementation Plan (DIP) specifically. The inclusion of local knowledge and expertise is quite evident throughout the document and provides yet another thread in the entwined rope of trust developed during the TMDL process. We also thank you for the opportunity to comment on the draft DIP.

(Ecology response) Thank you, in turn, for the dedicated work that the staff and board of the Kittitas County Water Purveyors (KCWP) have contributed to this document and this TMDL project. Your input has been critical to the development of the TMDL documents, and will continue to be vital to the success of this TMDL.

Comments regarding the DIP are listed below and presented in order as they arose upon review of the draft.

KCWP fully supports the purpose of the TMDL as stated on page 2 of the Total Maximum Daily Load (TMDL) Detailed Implementation Plan (DIP) Draft. "The purpose of this TMDL is to reduce levels of fecal coliform bacteria in Wilson Creek and its tributaries, in order to protect human health in the Wilson Creek Sub-basin."

Page 2: "Full compliance expected…2020" does not reflect the current views of the KCWP, nor the views expressed by member of the Technical Advisory Workgroup (TAW) during the numerous workgroup discussions.

The estimation of full compliance is Ecology's view, as Ecology is responsible for development of the DIP. FC levels will be reassessed at the target dates to evaluate whether targets are met.

Page 2: Add new development to list of non-point bacteria contributors.

To add simplicity, all former references to "older" homes have been removed. This change should help clarify that all failing septic system issues and other streamside-living issues will refer to both newer and older homes.

Page 4, Domestic pets (waste): add "disposed of" to "deposited in."

Now added.

Page 4, Humans: Add recreationists' and travelers' defecation nearby or alongside of waterways. The KCWP documented multiple instances of this occurring during the summer of 2006. Human waste is more likely to cause health problems in people than other manure sources.

Good point, now added.

Page 4, Wildlife: besides the warm-blooded animals living in the streams, waterfowl and other birds perched or nesting on/under bridges contribute bacteria directly into waterways. Fish, while cold-blooded, are also a source/host for fecal coliform bacteria.

Perched/nesting birds were included in an earlier draft of this DIP, and are now included in the final version. We appreciate the information regarding fish as a potential carrier for E. coli bacteria; this may be an interesting future research topic.

Page 16: Large game (wildlife) is not necessarily entering waterways to drink as the chart leads the reader to assume. Large game frequently crosses waterways just to get to the other side. This is not to say that crossing ought to be provided, only that the situation will not be removed entirely by providing off-stream drinking water.

The document currently states that providing off-stream watering for large game may result in "less entry of large game animals into streams" and that "fewer large game animals [may] linger in water bodies." This does not infer that providing off-stream watering will entirely change the situation.

Page 17, first paragraph: The first sentence implies that it is a restatement of the DIP's goal as stated on page two. However, this is false. Page two states that the purpose is based on human health needs—page 17 replaces human health needs with TMDL targets. These are not identical or interchangeable goals.

The purpose of the TMDL is the overall intent of the TMDL, while the goal of the TMDL is the specific level of water quality that we will strive to attain. The purpose and goal are meant to be complimentary, not identical or interchangeable. In this case, the purpose of the Wilson Creek Sub-basin Bacteria TMDL is to reduce FC levels in order to protect human health, while the goal is to meet the TMDL targets for FC, as described in Appendix A. The final targets are set to meet Class A water quality standards for FC. Both the purpose and goal are stated early in the DIP document (in sections titled "Purpose" and "Approach"), with the goal restated later in the document (under "Measuring Progress Toward Goals").

Page 18, Reasonable Assurance: We know of no bacteria TMDL in Washington State that has proved itself effective unless point-source problems (such as dairy operations) were identified and remedied. No known point-sources exist in the Wilson Creek Sub-basin. Therefore, the KCWP does not believe reasonable assurance to meet state standards exists. We assume that a handful of septic systems will be found deficient and their remedy will likely reduce bacteria levels in the local water. However, the ensuing reduction is paltry when compared to dairy effluent and malfunctioning sewer treatment plants.

There are two point sources in the Wilson Creek Sub-basin: the City of Kittitas municipal sewage treatment plant, and one concentrated animal feeding operation (CAFO). Both of these are in compliance with their permit requirements for FC discharge. As you have noted, large reductions in FC pollution have occurred in some locations where point sources of FC were brought into compliance. However, as in the case of the Dungeness watershed, considerable nonpoint FC reductions can also be achieved. Ecology feels that it is too early in this TMDL process to assume that the Wilson Creek Sub-basin Bacteria TMDL will not be effective.

Appendix A, page 4; Table A-1 contains formatting errors.

Thanks, now fixed.

Appendix F, Ambient Water Quality: Who is responsible for data evaluation?

Each sampling group is responsible for verification of their data. Ecology is ultimately responsible for data evaluation, in consultation with sampling groups. This has been clarified in the DIP.

Appendix F, Detailed Monitoring Plan: Source Identification: Data availability should not be reliant solely on a date, but on completion of quality assurance/quality control measures as appropriate. Further, why does this date apply only to source ID, and not to other data? Other data types are not given “due dates” specifically or generally.

The date of data availability (Feb 1 of each year) refers to all FC data collected for this TMDL, not just source data. The date is an estimate and a goal – it was intended to coincide with completion of QA/QC measures and is included to encourage samplers to make data available soon after data collection and verification. This has been clarified in the DIP.

Again, the KCWP appreciates the opportunity to comment on the DIP. Please contact us for clarification of any of our comments, or for any other questions you might have. We look forward to your responses in the final DIP.

Sincerely,
Kathleen Satnik
Water Quality Specialist